Impact of previous hamstring strain injury on rate of torque and EMG development during eccentric contraction.

Background: Hamstring strain injuries (HSIs) are prevalent in sport and re-injury rates have been high for many years. Whilst much focus has centred on the impact of previous hamstring strain injury on maximal eccentric strength, high rates of torque development is also of interest, given the important role of the hamstrings during the terminal swing phase of gait. The impact of prior strain injury on neuromuscular function of the hamstrings during tasks requiring high rates of torque development has received little attention. The purpose of this study is to determine if recreational athletes with a history of unilateral hamstring strain injury, who have returned to training and competition, will exhibit lower levels of eccentric muscle activation, rate of torque development and impulse 30, 50 and 100ms after the onset of electromyographical or torque development in the previously injured limb compared to the uninjured limb. Methods: Twenty-six recreational athletes were recruited. Of these, 13 athletes had a history of unilateral hamstring strain injury (all confined to biceps femoris long head) and 13 had no history of hamstring strain injury. Following familiarisation, all athletes undertook isokinetic dynamometry testing and surface electromyography assessment of the biceps femoris long head and medial hamstrings during eccentric contractions at -60 and $-180^{0}.s^{-1}$. Results: In the injured limb of the injured group, compared to the contralateral uninjured limb rate of torque development and impulse was lower during $-60^{0}.s^{-1}$ eccentric contractions at 50 (RTD, p=0.008; IMP, p=0.005) and 100ms (RTD, p=0.001; IMP p<0.001) after the onset of contraction. There was also a non-significant trend for rate of torque development during $-180^{0}.s^{-1}$ to be lower 100ms after onset of contraction (p=0.064). Biceps femoris long head muscle activation was lower at 100ms at both contraction speeds ($-60^{0}.s^{-1}$, p=0.009; $-180^{0}.s^{-1}$, p=0.009). Medial hamstring activation did not differ between limbs in the injured group. Comparisons in the uninjured group showed no significant between limbs difference for any variables. Conclusion: Previously injured hamstrings displayed lower rate of torque development and impulse during eccentric contraction. Lower muscle activation was confined to the biceps femoris long head. Regardless of whether these deficits are the cause of or the result of injury, these findings have important implications for hamstring strain injury and re-injury and suggest greater attention be given to neural function of the knee flexors.